

REMARKS

The present invention is directed to a co-catalyst for purifying an exhaust gas, comprising a composite oxide including (a) cerium; and (b) at least one element selected from the group consisting of zirconium, yttrium, strontium, barium and a rare-earth element supported on a particulate aluminum oxide support, and optionally a precious metal catalyst.

The Examiner has attached to the Office Action of a Notice of References Cited, Form PTO-892, wherein eight (8) references have been cited.

From page 2 to page 6 of the Office Action, the Examiner has referred to total twenty-one (21) references, among them, thirteen (13) are not cited on Form PTO-892, including Brezny (U.S. Pat. No. 5,919,727), Domesle (U.S. Pat. No. 5,958,829), Chopin et al (U.S. Pat. No. 5,693,299), Chopin et al (U.S. Pat. No. 5,532,198), Bonneau et al (U.S. Pat. No. 5,908,800), Chopin et al (U.S. Pat. No. 5,712,218), Chopin et al (U.S. Pat. No. 5,607,892), Chopin et al (U.S. Pat. No. 5,883,037), Chopin et al (U.S. Pat. No. 5,626,826), Blanchard et al (U.S. Pat. No. 5,352,646), Wu et al (U.S. Pat. No. 6,107,240), Domesle et al (U.S. Pat. No. 5,496,788) and Suzuki et al (U.S. Pat. No. 6,150,288). The Examiner has provided copies of all the references cited. Applicants respectfully request that the Examiner further provide a Form PTO-892 citing the omitted references to the undersigned attorney.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/831,450

In this Amendment, claims 1 and 3 have been amended to correct typographical errors and/or to overcome the objections. These amendments are not deemed to narrow the scope of the claimed subject matter.

No new matter has been added and entry of this Amendment is respectfully submitted to be proper. Upon entry of this Amendment, claims 1-3 are all the claims pending in the application.

In Paragraph No. 2 of the Office Action, claims 1-3 have been objected to for alleged informalities.

In Paragraph No. 4 of the Office Action, claims 1-3 have been rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Brezny (U.S. Pat. No. 5,919,727) in view of Domesle et al (U.S. Pat. No. 5,958,829).

Regarding the objections, Applicants respectfully submit that the claims as amended are proper. In this Amendment, Applicants have amended claims 1 and 3, along the lines of the Examiner's suggestion.

Accordingly, the Examiner is respectfully requested to reconsider and withdraw the objections.

Regarding the §103(a) rejection over Brezny in view of Domesle et al, Brezny was relied upon to disclose a composite powder containing cerium oxide and at least one other non-noble metal oxide in solid solution (column 2, lines 24-25), having a surface area of about $60 \text{ m}^2/\text{g}$, an oxygen storage capacity is about $200\text{-}600 \text{ }\mu\text{mol/g}$ up to about 700°C , about $500\text{-}1200 \text{ }\mu\text{mol/g}$ up to about 1000°C (column 2, line 66-column 3, line 18), wherein the non-noble metal oxides include zirconia, yttria, lanthanides, actinide, and combination thereof (column 2, lines 38-44).

Brezny was also relied upon to disclose that the composition is coated onto a substrate and has a noble metal catalyst deposited onto the composition (column 6, claim 14).

It was conceded that Brezny does not disclose the aluminum oxide support as presently claimed. However, it was asserted that it would have been obvious to one skilled in the art to use aluminum oxide support in view of the advantages taught in Domesle et al, which are improved light-off performance, high conversion rates, and high long-term activity (column 4, line 66-column 5, line 2).


Brezny was further relied upon to disclose that after aging at up to about 1000°C , the composite powder has a surface area of about $1\text{-}50 \text{ m}^2/\text{g}$, and an oxygen storage capacity of about $300\text{-}500 \text{ }\mu\text{mol/g}$ up to 700°C and about $500\text{-}1200 \text{ }\mu\text{mol/g}$ up to 1000°C (column 3, lines 9-17).

Applicants respectfully submit that claims 1-3 are not *prima facie* obvious over Brezny in view of Domesle et al, because Brezny in view of Domesle et al do not teach or suggest the present invention.

Domesle et al disclose a coating dispersion containing active aluminum oxide as a support material and at least one member selected from the group consisting of rare earth oxides, cerium oxide, zirconium oxide, nickel oxide, iron oxide, germanium oxide and barium oxide (column 6, lines 37-41), wherein the aluminum oxides used have qualities of pure γ -aluminum oxide (column 12, lines 35-36).

Brezny teaches a process for preparing the powder including: (1) making a homogeneous, aqueous solution of a cerium salt and at least one non-noble metal salt and (2) drying a fine mist of the resulting mist by heating at a temperature of about 500-1000°C, during which the salts of the particles decompose, forming particles of the cerium oxide and the at least one non-noble metal oxide mixed on the atomic level in complete solid solution (column 2, lines 24-36 and abstract).

Brezny does not teach or suggest the use of aluminum oxide in the composite powder. Further, Applicants submit that it may be impossible to perform the spray pyrolysis-process of Brezny in the presence of aluminum oxide. Aluminum oxide is not water-soluble. Accordingly, no homogeneous aqueous solution can be formed.



AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/831,450

Since a powder containing aluminum oxide may not be produced by the same process as in Brezny, Applicants submit that the properties of the resulting powder would be different from those of the powder of Brezny (column 1, lines 53-57).

Therefore, even if it is assumed, *arguendo*, that there might be a suggestion to combine the references, the combination would not result in the present invention.

In view of the above, the Examiner is respectfully requested to reconsider and withdraw the rejection. Early favorable action is earnestly solicited.

In the event that the Examiner believes that it may facilitate the further prosecution of this application, the Examiner is invited to contact the undersigned attorney at the local Washington, D.C. telephone number indicated below.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/831,450

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Fang Liu
Registration No. 51,283

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE



23373

PATENT TRADEMARK OFFICE

Date: March 17, 2003

APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (amended) A co-catalyst for purifying an exhaust gas comprising:
a composite oxide including (a) cerium; and (b) at least one element selected from the group consisting of zirconium, yttrium, strontium, barium and a rare-earth element supported on a particulate aluminum oxide support;

wherein a specific surface area of the co-catalyst after sintering ~~being is~~ not less than 40 m²/g; an oxygen storage capacity at 400 °C ~~being is~~ not less than 10 μmols/g, and an oxygen storage capacity at 700 °C ~~being is~~ not less than 100 μmols/g.

3. (amended) A catalyst for purifying an exhaust gas comprising:
a precious metal catalyst; and
a co-catalyst for purifying an exhaust gas including a composite oxide including (a) cerium; and (b) at least one element selected from the group consisting of zirconium, yttrium, strontium, barium and a rare-earth element supported on a particulate aluminum support;

wherein a specific surface area of the co-catalyst after sintering ~~being is~~ not less than 40 m²/g; an oxygen storage capacity at 400 °C ~~being is~~ not less than 10 μmols/g, and an oxygen storage capacity at 700 °C ~~being is~~ not less than 100 μmols/g ~~supported on a particulate aluminum oxide support~~.